

# SOIL SURVEY OF GREENE COUNTY, PENNSYLVANIA.

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## DESCRIPTION OF THE AREA.

Greene County is situated in the extreme southwestern corner of the State of Pennsylvania. It is bounded on the north by Washington County; on the east by the Monongahela River, which separates it from Fayette County; on the south by West Virginia, the western end of the Mason and Dixon line forming the dividing line; and on the west by that part of West Virginia known as the panhandle. The county is roughly rectangular in shape, and about 30 miles long and 19 miles wide. It has an area of 574 square miles, or 367,360 acres.

Physiographically Greene County is an old high plateau which has been altered and dissected by long periods of weathering and erosion. In its present condition it comprises numerous hills and peaks of irregular distribution, the highest points of which lie at approximately the same level. The topography ranges from almost level, in small areas, to gently rolling, rolling, and very hilly. The hilly topography is shown in Plate I, figures 1 and 2.

In the northeastern part of the county, along or near the Monongahela River, there are conspicuous old stream terraces standing high above present overflow, which have a flat to undulating surface. There are other flat terraces, not so wide and less eroded, along Ruff, Muddy, Whiteley, Dunkard, Little Whiteley, and South Fork Tenmile Creeks.

These stream terraces or benches are not continuous along the streams, although some extend without interruption for 5 or 6 miles. They have about the same elevation; that is, from about 1,120 to 1,140 feet above sea level. It is possible that these old alluvial plains standing at so nearly the same level mark approximately the base level of erosion at the time they were formed.

The stream bottoms range from a few feet to about one-half mile in width, the largest strips being those along South Fork Tenmile, Ruff, Muddy, and Whiteley Creeks. These bottoms are flat or slightly hummocky.

The topographic map shows, for the county as a whole, a range in elevation from 750 feet above sea level on the Monongahela River to 1,660 feet in the southwestern part of the county. The crests of

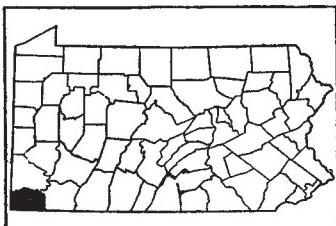


FIG. 41.—Sketch map showing location of the Greene County area, Pennsylvania.

most of the principal ridges and hills in the northwestern and south-central parts of the area are between 1,400 and 1,500 feet above sea level. Along the main divide between the Monongahela River and the Ohio River to the west, elevations as high as 1,500 and 1,600 feet are of common occurrence. The highest points along this divide are surprisingly uniform in elevation—1,580 feet northeast of Time, 1,660 feet between Time and Graysville, 1,580 feet between Bristoria and White Cottage, 1,600 feet near Nettle Hill, 1,600 feet near Ashtree, and 1,620 feet near the southern boundary. This uniformity of upper level is also marked throughout the southern and southwestern parts of the county.

The general trend of the hills of Greene County, where there is anything like a trend, is from northwest to southeast.

The topography of the uplands is prevailingly steep, but owing to the slowness of erosion in this section a much larger proportion of the land is cultivated than would be possible on slopes no steeper in many parts of the country. Many slopes are cultivated which are too steep for the use of labor-saving farm implements. Sleds are used by many farmers for hauling their hay and grain from many of the fields.

The surface drainage of the greater part of Greene County finds its way to the Ohio River by way of the Monongahela River. The watershed which separates the drainage of the Monongahela and Ohio Rivers begins at a point on the Washington County line near the northern extremity of Morris Township, follows a very irregular southerly course through the eastern part of Richhill Township, crossing Jackson Township near its center, thence crossing the northwest corner of Gilmore and the southwest corner of Springhill Townships, and passing into West Virginia near the center of the southern boundary of Springhill Township. East of this ridge the drainage is into the Monongahela River through numerous streams and streamlets. The largest of these is South Fork Tenmile Creek, which with its tributaries drains at least one-third of the entire eastern side of the county; Dunkard Creek, the next largest, drains the southern and southeastern parts; and Muddy, Whiteley, and Little Whiteley Creeks drain the central-eastern part of the area. The western side of the divide is drained chiefly by Enslow Fork of Wheeling Creek and Pennsylvania Fork of Fish Creek. Nearly every farm is well watered by springs and streams.

The main streams have deeply cut channels and flow rather sluggishly at normal water stages, but the upper courses have a steeper gradient and flow much faster, and presumably are cutting their channels much more actively. A noticeable feature of the drainage of this area is that the main streams have longer tributaries on the north than on the south. In other words, the streams do not lie midway between the divides, but crowd the south side of the drainage basins. The long straight course of Smith Creek is an exception.

Greene County was formed in 1796 from a part of Washington County, but as early as 1760 white men had penetrated the section now included in the county. The early settlers came chiefly from the Virginias and were mostly of English descent. The first settlements were naturally in the valleys of the main streams, and the home sites were determined by available water power or the presence of level land wide enough to accommodate villages. The flood plains were

the first lands to be cultivated. Even now all post offices in the county with one exception (Wind Ridge) are in the stream bottoms. As the population increased, the settlers advanced along the principal creeks and their tributaries, later reaching out to the tops of the ridges.

The population of the county in 1920 was 30,804. The rural population, according to the 1920 census reports, was 27,472, with a density of 47.9 persons to the square mile. The present population consists of the descendants of the early settlers and later immigrants, mostly from the Virginias and parts of Pennsylvania. Much of the population of coal-mining towns along the Monongahela River and in other localities consists of foreigners. The agricultural population is fairly evenly distributed throughout Greene County, the eastern part of the county being somewhat more thickly settled.

Waynesburg, the county seat, is the largest town, with a population in 1920 of 3,332. Other incorporated towns are Carmichaels, with a population of 491; Jefferson, 392; Greensboro, 516; Mount Morris, 328; and New Freeport, 206. There are a number of other villages scattered over the county. The recent development of some villages, such as Mather, Crucible, Nemacolin, and Pitt Gas, has been due to the working of newly opened coal seams.

Transportation facilities for the county as a whole are limited. The Waynesburg & Washington Railroad, a narrow-gauge branch of the Pennsylvania Railroad system, runs between Waynesburg and Washington, Pa., connecting with the Baltimore & Ohio and the Pennsylvania Railroads. The Monongahela Division of the Pennsylvania Railroad enters the northeast corner of the county, one branch stopping at Jefferson and the other running up the Monongahela River as far as the town of Nemacolin. The Monongahela Railway crosses the river from Fayette County about 1 mile above Greensboro and continues up the river into West Virginia. The Morgantown & Wheeling Railway enters the southern part of the county, having its terminus at Brave. These railroads and the Monongahela River afford ample transportation facilities for a considerable part of the county. There are no transportation lines in the western part.

The public roads are good during the summer months and generally bad in winter. Short stretches of macadamized, brick, and concrete roads have been built out several miles from the larger towns. A fine concrete road connects Waynesburg with Jefferson and Carmichaels and other concrete and hard-surfaced roads are under construction. The value of hard-surface roads in the wet winter months is very evident, as the dirt roads become almost impassable during winter and early spring. In the summer they are good and are easily maintained by dragging after each rain.

Every village and town in the county has good public-school facilities and rural schools are distributed throughout the area. Telephone lines connect all the towns and villages and penetrate nearly every section of the county. Rural and star mail routes are so distributed that practically every farmer receives daily mail.

The principal markets and shipping points in Greene County are Waynesburg and Jefferson. Other small shipping points are Swarts, Sycamore, Deerlick, Brave, and several along the Monongahela River. Pittsburgh and Baltimore are the principal markets outside of the county, wool being generally shipped to Baltimore and livestock to Pittsburgh.

## CLIMATE.

The climate of Greene County is healthful. The summers are rather short and pleasant, and the winters are cold, but severe cold spells are of short duration. The temperature through the winter months (December, January, and February) falls below zero occasionally. The records of the Weather Bureau station at Aleppo give the annual mean temperature as 51.2° F. The winter mean is 30.5° F. and the summer mean is 69.9° F. The highest recorded temperature was 100° F. in August, and the lowest was -27° F. in January. There is considerable snow during the winter, with a yearly average fall of 34.9 inches. The date of the latest recorded killing frost in the spring is June 10 and that of the earliest in the fall is September 10. The average dates of the last killing frost in spring and the first in fall are May 14 and October 3, respectively. This gives a growing season of 142 days.

The average annual precipitation at Aleppo is 40.68 inches and is fairly well distributed throughout the year. At Uniontown, Fayette County, which is about 16 miles from the east side of Greene County, the length of growing season is 164 days and the average rainfall 47.29 inches, the rainfall being heaviest in the spring and summer and lightest in the fall. The total rainfall at Aleppo for the driest year on record was 35.58 inches, and for the wettest year, 54.53 inches.

The climatic data in the tables following, compiled from the records of the Weather Bureau stations at Aleppo, Greene County, and Uniontown, Fayette County, give more detailed information.

*Normal monthly, seasonal, and annual temperature and precipitation at Aleppo.*

(Elevation, 1,135 feet.)

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1910).	Total amount for the wettest year (1907).	Snow, average depth.
December .....	31.9	70	-14	3.31	2.40	3.25	6.5
January .....	30.7	75	-27	3.90	6.85	7.03	12.3
February .....	28.8	70	-20	2.44	3.87	1.99	8.2
Winter .....	30.5	75	-27	9.65	13.12	12.27	27.0
March .....	42.6	84	-3	4.05	.25	8.17	4.9
April .....	49.5	90	12	3.62	3.10	3.34	1.4
May .....	61.4	94	23	3.66	4.18	3.60	.0
Spring .....	51.2	94	-3	11.33	7.53	15.11	6.3
June .....	67.3	94	33	3.93	2.54	3.90	.0
July .....	72.1	98	41	4.97	5.15	9.46	.0
August .....	70.2	100	39	3.15	1.12	3.63	.0
Summer .....	69.9	100	33	12.05	8.81	16.99	.0
September .....	65.2	97	28	2.87	2.52	3.79	.0
October .....	53.4	89	17	2.70	1.80	3.64	T.
November .....	41.2	78	6	2.08	1.80	2.73	1.6
Fall .....	53.3	97	6	7.65	6.12	10.16	1.6
Year .....	51.2	100	-27	40.68	35.58	54.53	34.9

*Normal monthly, seasonal, and annual temperature and precipitation at Uniontown,  
Fayette County.*

(Elevation, 999 feet.)

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1904).	Total amount for the wettest year (1890).
December .....	° F. 34.9	° F. 73	° F. -13	Inches. 3.65	Inches. 1.89	Inches. 6.84
January .....	32.3	80	-19	3.93	2.83	6.10
February .....	31.4	77	-22	3.12	2.61	4.73
Winter .....	32.9	80	-22	10.70	7.33	17.67
March .....	41.1	84	-10	4.27	4.32	6.27
April .....	50.8	93	15	3.74	3.72	3.90
May .....	62.0	96	28	4.20	3.64	8.03
Spring .....	51.3	96	-10	12.21	11.68	18.20
June .....	70.0	101	37	4.82	2.52	4.33
July .....	73.0	98	44	5.40	3.29	5.65
August .....	71.6	101	43	4.55	3.61	8.44
Summer .....	71.5	101	37	14.77	9.42	18.42
September .....	66.1	94	32	3.26	1.99	6.73
October .....	54.3	92	20	3.11	1.27	7.41
November .....	43.3	78	13	3.24	.25	2.25
Fall .....	54.6	94	13	9.61	3.51	16.39
Year .....	52.6	101	-22	47.29	31.94	70.68

#### AGRICULTURE.

As early as 1760 a few settlers penetrated the region now included in Greene County, at that time inhabited by several tribes of Indians. The region was covered by a vast forest consisting chiefly of hardwoods, with some pine, spruce, and hemlock in the rougher sections along the Monongahela River and the larger creeks. The greater part of the forest has long since been cut and only about 15 per cent of the original heavy hardwood stand now remains, with here and there a few hemlocks.

The early agriculture was confined chiefly to land on the first and second bottoms of the streams and to the smoother uplands in the eastern part of the county, where subsistence crops, such as corn, wheat, oats, rye, and buckwheat, were grown, and for some years no attempt was made to raise more than sufficient for home consumption. As the population gradually increased the slopes of the hills were cleared to their summits and farm production exceeded the local demand. This condition made outside markets necessary, and trade was established with the southern Colonies by way of the Monongahela, Ohio, and Mississippi Rivers. Wheat was ground into flour, corn and rye converted into whisky, and these products were loaded on rafts and floated down the rivers to southern markets.

The continued cropping of the land to grain and the employment of poor methods of farming resulted in considerable deterioration in the yields, which decreased to such an extent that the growing of

cultivated crops was almost abandoned. These conditions, it is said, existed about the year 1800, when several farmers imported a number of merino sheep, which soon proved to be such a profitable investment that almost every farmer turned his attention to sheep raising. The soils of the region were adapted to grass and the greater part of the land that had been under cultivation was allowed to grow up to weeds, bushes, and bluegrass and converted into sheep pastures. The wool industry soon became a profitable business and the farmers prospered according to the number of sheep owned, some of those owning large flocks becoming wealthy.

In more recent years the selling of coal, oil, and gas rights has had a depressing effect on the agriculture, even though the location of a coal mine or oil or gas well on a farm does not necessarily cause any injury to the land. Coal rights are usually bought at a price per acre which often exceeds the value of the land for agricultural use. The owner of a farm on which an oil or gas well is located usually receives a certain percentage of the oil as long as it flows and when gas is struck in the process of drilling for oil, about \$300 an acre is awarded to the owner and free gas for his own consumption.

These sudden accretions of wealth have caused many to leave the farms and abandon farming; some use the money thus acquired to better equip their farms; while others, in anticipation of making a future sale of mineral or oil rights, lose interest in farming and neglect their land. In spite of all these influences there are many good farmers in the county.

At present the prevailing agriculture consists of the raising of livestock, in the following order of importance: Sheep, beef cattle, poultry, hogs, and to a small extent horses. The crops are principally subsistence crops for the home and crops adapted to feeding livestock.

Sheep raising is carried on in all parts of the county and is by far the most important enterprise. Both wool and mutton breeds are raised, but the former are the more common, the merino predominating. The sheep are pastured in the early part of the season on the rougher permanent pastures and later are turned into the mowing lands after the hay is cut. The wool is sold locally and shipped chiefly to Baltimore, and the mutton is shipped on the hoof to Pittsburgh. Some attention has been given to the improvement of breeds. Greene County has been for many years past one of the leading wool-producing counties in the State. According to the 1920 census, Greene County stood second in the State in wool production in 1919, being slightly exceeded only by her neighbor, Washington County. The total production in the two counties was almost 53 per cent of the total State production in that year. According to the census reports, Greene County in 1879 sheared 158,372 fleeces weighing 799,309 pounds; in 1889, 151,611 fleeces weighing 810,344 pounds; in 1899, 143,461 fleeces weighing 1,112,430 pounds; in 1909, 135,791 fleeces weighing 869,062<sup>1</sup> pounds; and in 1919, 108,472 fleeces weighing 851,043 pounds.

Beef cattle are next in importance to sheep. They are either raised locally or brought in from the western ranges when 2 years old to be fattened. The leading breeds are Hereford, Polled Angus, Shorthorn, and grades. These cattle are fattened on pasture and corn

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<sup>1</sup>Estimated.

and at the age of 3 or 4 years are shipped to Pittsburgh. Much is being done to improve the breeds of cattle.

Little attention is given to dairying in the county. There are, however, a few well-equipped small dairies located near the towns and villages. The hill farms are well suited to dairy farming, but as the roads are almost impassable in the winter and spring, it would at times be difficult to deliver the milk to shipping points. On some farms butter is made and stored until the roads dry up enough to be passable.

There are no large poultry farms in the county, but practically every farm has its flock of poultry. Plymouth Rock, Rhode Island Red, and Leghorn are the favorite breeds. Eggs and poultry are sold on local markets and shipped to Pittsburgh by parcel post and otherwise.

Hogs have not occupied an important place in the agriculture of Greene County, although enough are usually raised for home use and a few are shipped out. Chester White and Berkshire are the most popular breeds.

The chief crops grown in Greene County are corn, hay, wheat, oats, and such truck and orchard crops as are needed for home use.

The following table gives the acreage and production of the principal crops, as reported by the last five censuses:

*Acreage and production of the principal crops, as reported by the census, 1880 to 1920.*

Crop.	1880		1890		1900		1910		1920	
	Acres.	Bushels.								
Corn -----	30,441	1,083,255	29,622	989,803	27,867	971,530	24,976	982,709	20,733	871,200
Wheat -----	28,920	317,890	23,357	300,921	25,235	262,920	18,993	176,346	17,783	251,865
Oats -----	14,588	326,934	18,930	497,987	11,975	303,880	14,282	330,139	15,415	377,737
Potatoes -----	877	57,198	1,103	79,606	1,098	92,592	1,365	128,697	975	63,238
Buckwheat -----	1,052	11,316	90	797	100	760	78	937	28	429
Rye -----	731	6,417	462	4,538	113	1,190	294	3,038	183	1,878
Hay and forage..	28,569	Tons. 17,917	44,239	Tons. 53,034	40,714	Tons. 33,633	49,850	Tons. 49,521	52,850	Tons. 52,885

Corn grows equally well on the upland and bottom soils. Leamington and similar varieties mature well before killing frost. The crop is grown chiefly for the grain, which is fed on the farm. None is shipped out.

Hay is an important crop, occupying a large acreage. The soil of this area is capable of giving good yields of hay, but frequently the crops are light and of a poor quality, owing to poor management, including failure to keep the fields clear of weeds and bushes. It is not uncommon to leave the fields in sod 10 to 15 years and even longer, this giving rise to a weedy, bushy condition not at all conducive to good growth of grass. Most of the hay is stacked on the fields and is fed from the stack in the winter or hauled to the barns as needed. This allows much of the hay to become weather-beaten and more or less unpalatable, but it seems to be the best way of handling it on the steep slopes. When the hay is fed from the stacks the manure is automatically distributed over the fields. A small part of the hay is baled and shipped out of the county.

In all but the rougher parts of the county sufficient wheat is grown for home use and a few farmers produce a surplus for sale at the local markets. Wheat is grown mostly on the upland soils. Drills and harvesters are used where the hills are not too steep, but in the rougher sections the cradle is still used. The grain is threshed from the stack and the straw used as shelter and feed for stock during the winter months. Little is being done to increase the yield, such as the use of rotations including soil-improving crops like clover or field peas.

Oats are grown in about the same way as wheat and are of about equal importance. The grain is used as feed for horses and sheep, and the straw is stacked or baled. Both wheat and oats are threshed with portable outfits, which are moved from farm to farm by tractors.

A large part of every farm is devoted to pasture, including chiefly recently cut-over land, poorly drained bottom lands, and the rougher slopes. The pastures can easily be kept in excellent condition capable of affording an abundance of good grazing. Some of the more progressive farmers cut the weeds and brush off during the latter part of August, rake them up into windrows, and burn them. Bluegrass, which is indigenous to this locality, quickly takes the place of the other grasses and furnishes splendid pasturage.

There are a few small market gardens near the mining towns, but no important trucking industry. The soil is well adapted to vegetables, as is shown by the product of the home gardens all over the county. The second-bottom soils in the eastern part of the county around Carmichaels, Jefferson, Mapletown, and Dunkard are especially well suited to vegetables. Only a few potatoes are grown, and these are not well cared for.

There are many small farm orchards in the county, but these receive little or no attention. A few young orchards that have been well sprayed and pruned have demonstrated the fruit possibilities of the area.

The soils of Greene County are unusually uniform in every respect except topography. This alone affects their use and crop adaptation very considerably. The most hilly parts in the western side of the county are not farmed as much as the smoother areas. In parts of this rough section the original forest growth occupies nearly 50 per cent of the land, the remainder being used chiefly for pasture, with only small patches in cultivation. These steep slopes are much more subject to erosion and injury from drought than the smoother areas. Slopes of  $27^{\circ}$  are common, and some have a gradient of as much as  $35^{\circ}$ . The alluvial land along the streams and rivers is planted to the same crops as the upland, except that wheat is not often put on the first bottoms, where it tends to grow rank and to lodge. The grain is usually light and the straw heavy on these rich bottoms. Corn does better than wheat in the bottoms but is sometimes late in maturing. These bottom soils are largely given over to the growing of hay, corn, and pasture grasses.

Sod land is usually broken for corn, being plowed to a depth of about 5 to 7 inches and harrowed and well prepared. Reversible hillside plows are used on the steep slopes. Corn is sometimes check-rowed, but is more frequently drilled, one stalk every 12 inches or three stalks every 3 feet. The fields and the rows in the field follow the contours as much as possible; in fact, in some instances the fields

encircle the hill. The crop is cultivated with a one-horse single-row cultivator. It is cut and shocked in the fall. After husking, the fodder is taken to the barns to be used for feeding livestock. The corn stubble is plowed under and the land harrowed for the oat crop.

Oats are sown in the spring, usually with modern drills, but sometimes sown broadcast by hand. Harvesting in most cases is done with reaper or binder, but the cradle is used in some of the less progressive or hilly sections. The oats are shocked in the field, being left until dry, then stacked and threshed from the stack.

The oat stubble is usually plowed the latter part of August or early September for wheat, the land harrowed and dragged, and the wheat drilled in. Fertilizer, if used, is applied at the time of seeding. The wheat is harvested and cured in the same way as the oats, and stacked side by side with the oats for convenience in threshing.

Grass is sown with the wheat, a mixture of timothy and clover, sometimes including redtop, being used. The hay, after being cut and allowed to cure in the swath, is usually raked with dump rakes, cocked, and stacked. Some side rakes are used where the hay is stacked without cocking. This method of stacking hay in the field is practiced in order to save hauling it either up or down steep hills to the barns. Sleds are used on some of the steeper hills.

The farm buildings are fair to good, and the best farmers keep their buildings painted and well cared for. Farm implements are for the most part modern. Tractors are not used, except in the smoother parts of the county.

No definite crop rotations are practiced in the county. The object seems to be to get the land seeded to grass, and to do this it is customary to plant corn, oats, wheat, and then grass, leaving the latter crop stand from 2 to 10 or even more years. Some farmers, in order to get their land reseeded as quickly as possible, plow the sod and sow oats or wheat, seeding the grass at the same time.

Comparatively little fertilizer is used. The 1920 census reports 22.8 per cent of all farms as using fertilizer, at a total cost of \$43,570, or an average of \$60 per farm reporting. Sixteen per cent acid phosphate at the rate of about 100 to 200 pounds per acre is applied to wheat and corn. A still smaller number of farmers are using lime, either burned lime or ground limestone.

A large percentage of the farmers get along without any hired labor, except exchange at threshing time. At present American white labor is plentiful at the rate of \$25 to \$50 a month, including board, washing, and lodging. Day labor usually receives \$2 a day. According to the 1920 census 49.3 per cent of the farms of the county reported hired labor at a total expense of \$245,658, or an average of \$157 per farm reporting.

Farms range in size from 10 to 500 acres, the average size in 1920 being 110.1 acres. In 1920 there were 3,168 farms in the county, 80.4 per cent of which were operated by the owners, 18.2 per cent by tenants, and 1.4 per cent by managers. Farms are rented both for cash and on shares. When the owner furnishes everything except labor the tenant receives one-third of the crops, and when the tenant furnishes the work stock and equipment he receives one-half of the crops. The tenant is paid by the day for labor spent on permanent improvements.

The value of the land is more or less dependent on the "rights" that go with it. If the coal rights have not been previously sold the land value is much higher than if they have been contracted for. The Pittsburgh coal vein, which is the largest and most important vein in the county, has practically all been contracted for, and in some cases the smaller veins are also sold. At present (1921) the price of the better land, exclusive of that over the Pittsburgh coal vein, ranges from about \$60 to \$125 an acre; the rougher land and that farthest from good roads, as in the southwestern part of the county, is much cheaper. Especially well developed farms on the wider terraces often sell for \$150 an acre and sometimes more.

#### SOILS.<sup>2</sup>

Greene County is located wholly within the Allegheny Plateau. The soils in this area may be classified, on the basis of their origin or mode of formation, into three broad groups: (1) Upland residual soils, (2) terrace or old-alluvial soils, and (3) first-bottom or recent-alluvial soils. Each of these groups is represented by one or more soil types.

The upland residual soils are the most extensive, covering about 89 per cent of the entire area. They are derived from the weathering and decay of the underlying rocks, which consist largely of light-colored noncalcareous and slightly calcareous shales, with occasional thin beds of limestone and thicker beds of noncalcareous sandstone, and some seams of coal. These rock strata lie in a nearly horizontal position. Under the forces of weathering, the rocks have decayed and erosion has cut into the disintegrated material in such a way that an extremely rolling to hilly type of topography has developed. Flat areas, except in the narrow strips of stream alluvium, are extremely rare. The uplands are almost entirely of a sloping character, the layer of disintegrated material is of varying thickness over the parent rock, and there is almost everywhere constant transposition by wash of surface material to the slopes below. Along some of the smoother ridge crests the soil has lain in place, without rapid disturbance by erosion, a sufficient length of time to develop a soil with fairly well-defined layers or horizons through the vertical section, but it is only in these smooth areas where this development has taken place. Almost all of these older and better developed soil areas have been derived from light-colored shale and show in forested areas the following predominant characteristics: Leaf mold of varying thickness overlying (1) light-brown to yellowish-brown silt loam of a fairly mellow consistency, ranging to depths of 4 to 8 inches; (2) pale-yellow silty clay loam, passing at 12 to 15 inches into yellow silty clay of moderate friability to slight stiffness; and (3) a mixture of yellow

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<sup>2</sup> The soils of Greene County, Pa., do not join up well with those of the Morgantown area, West Virginia, which was mapped in 1911, because in the latter area much soil was classified as Meigs clay loam, owing to the presence of very small areas of Upshur soil scattered here and there through the type. There was so little of this chocolate-red Upshur soil in Greene County that it was deemed advisable not to classify this soil as Meigs, except in the southwestern part of the county, where much more of the red Upshur material occurs. Along the boundary of the Morgantown area in the southeastern part of Greene County, the Westmoreland silt loam of Greene County joins with the Westmoreland silty clay loam in the Morgantown area, undoubtedly because the soil in the Morgantown area was so predominantly silty clay loam in texture that it was not deemed necessary to establish a silt loam type near the boundary. In the West Virginia area it was undertaken to separate those portions of the soil which were believed to have no limestone material in their make-up. In Greene County many areas of the Westmoreland probably have very little or no limestone material in their composition, but the location of such areas was so difficult to determine that no attempt was made to separate them. Some of the small strips of alluvial soil do not join up very well with the alluvial soils of the Morgantown area because some changes in the correlation have been necessary since the Morgantown area was mapped.

silty clay and yellowish fragments of parent rock sometimes showing specks and splotches of grayish-brown, and rusty-brown color, and passing at depths varying from about 24 to 48 inches into the parent rock, which may be either hard or somewhat softened by decay.

The characteristics that might be expected to develop in a fine-textured soil on flat areas in this region are probably closely approximated by the Monongahela silt loam, a soil developed on flat areas of the stream terraces, where the soil has lain sufficiently long to receive, it is believed, the full impress of the climate. In this type there are three distinct soil sections, as follows: (1) Light-brown to light yellowish brown silt loam of a fairly mellow consistency, extending to depths of 6 to 10 or 12 inches; (2) pale-yellow to yellow silt loam to silty clay loam, friable and faintly mottled with gray, extending to depths ranging from 18 to 22 inches; and (3) yellow or pale-yellow heavy silty clay loam to silty clay, mottled with gray and brownish colors and having a slight compactness. The third layer extends downward to depths of 4 feet or more.

The other upland soils are very largely sloping and rolling, so that the material varies greatly in depth and content of rock particles and fragments, and shows little regularity in the layers from the surface down. Usually the sloping soils vary markedly as to profile characteristics within a few hundred feet. Under these conditions the underlying rocks largely determine the character of the soil material. The red shales give soils having the color of the parent rock, the thin beds of outcropping limestone give rise to patches of a stiff brownish clay often varied by overwash from lighter slopes, and the fine-grained, light-colored shales give a brownish to pale-yellow silty soil. Large areas are so variable in soil character from place to place that separation into distinct types was found to be impracticable, so that they were grouped under names which, while carrying a type and texture of the predominant material, nearly represent undifferentiated soils. The Meigs silty clay loam is of this character, and the Westmoreland also is admittedly of a variable character, including soil derived from both noncalcareous shales and limestone.

There is no free lime carbonate in the material comprising the soils of Greene County, at least not enough to cause effervescence with hydrochloric acid, either in the soil or subsoil, with the possible exception of some of the freshly decayed rock material composing the Indian-red soils. In the weathering of the limestone, as well as the calcareous shales, practically all of the carbonate of lime has been carried off in solution by water. Most of the soil-forming rocks, aside from limestone, contain very little lime carbonate in their original condition. The Indian-red shales may be locally calcareous, that is, certain thin beds of rock carrying some carbonate of lime.

The soils of Greene County are classified in soil series on the basis of similarity in origin, color, and structural characteristics. The soil series consists of soil types that differ from each other mainly in the texture or relative coarseness or fineness of the surface soil. The type is the unit of soil mapping.

Soils derived from the weathering of gray and brown shales, sandstone, and thin interbedded layers of limestone, the material being more or less mixed, have been classed in the Westmoreland series. The

types comprising this series are brown to yellowish brown or light brown in the surface soil and yellow or yellowish brown in the subsoil, with some gray mottling in places in the lower part of the subsoil. The subsoil is somewhat stiffer than the subsoil of the Dekalb soils, which prevail in other parts of the Appalachian region, and the Westmoreland soils are considered more productive because of the admixture of material derived from limestone. The Westmoreland silt loam is the principal upland soil, and covers about 77 per cent of the county. A steep phase of the silt loam, and the gravelly loam, with a smooth phase, also are mapped.

The Brooke series, including soils of limestone or predominately limestone derivation, occurs in small patches, often too small to map. The Brooke soils are brownish to yellowish in the surface layer, yellow or olive drab and usually stiff in the subsoil, with mottlings of gray or bluish gray in the lower part. They frequently contain rusty-brown and brown concretionary material in the deep subsoil. The Brooke silt loam is the only type of this series mapped.

The Meigs soils include areas of mixed materials, resulting in an intimate association of red, gray, and yellow soils, and mixtures of these, especially where there have been slides. The red material is that of the Upshur series, derived from Indian-red shale or fine-grained sandstone, while the lighter colored material is of the character of the Dekalb or Westmoreland.

The terrace or old-alluvial soils occur chiefly along the Monongahela River and South Fork Tenmile Creek. The material of these soils was deposited when the water of the streams flowed at higher levels than at present. The largest areas are those on the old valley floor, where the Monongahela River abandoned its original channel and moved to other channels by cutting off oxbow bends. This material includes wash from soils derived from sandstone, shale, calcareous shale, and limestone, and consists for the most part of silt overlying fine sand and gravel to varying depths. In road cuts and excavations near Little Chicago, gravel and larger boulders are exposed, some of the boulders having a diameter of several feet. Two soil series, the Monongahela and the Tyler, are developed on these terraces.

The Monongahela soils have light-brown to yellowish-brown or yellow surface soils and a yellow to pale-yellow, slightly stiff or moderately friable subsoil, with gray or bluish-gray mottlings in the lower subsoil. The mottled layer is often compact. The surface is nearly level to gently rolling and the drainage is fair to good. The Monongahela soils are composed of old alluvial material derived entirely or mainly from soils of sandstone and shale origin. There are local small areas of limestone soil in some of these basins, but not much. These soils are lighter brown than those of the Holston series and paler yellow in the upper subsoil. The Holston typically does not have the mottled section present in the Monongahela.

The Tyler soils have mottled gray, brown, and yellow surface soils, and a mottled bluish-gray and brown or yellow subsoil. They occupy level to slightly depressed areas on the high terraces, and their drainage is poorly established. The Tyler silt loam is mapped here.

The first-bottom soils are composed of recent alluvial deposits. They occupy the flat lands of the stream bottoms, and are subjected

to frequent overflows and deposition of alluvium by flood waters after heavy rains. Narrow strips of these alluvial soils are found along most of the streams in the county. They are classed in two series, the Pope and the Atkins.

The Pope soils have brown to deep-brown mellow surface soils and a light-brown to yellowish friable subsoil. The drainage between periods of overflow is good, with the exception of some sags or depressions. The Pope silt loam is mapped.

The Atkins types have grayish or brownish-gray surface soils with rusty-brown mottling, and a mottled bluish-gray and pale-yellow subsoil, containing rusty-brown or yellowish-brown concretionary material. The drainage is poor at all times. Crawfish holes are found in places. The Atkins silt loam occurs in this area.

Rough stony land, a miscellaneous classification, includes those areas of rough mountainous land where large stones and rock outcrops are so numerous as to preclude the use of the land for agriculture.

In subsequent chapters the soil types and phases are described in detail and their relation to agriculture is brought out. The table below gives the actual and relative extent of the various soil types mapped in Greene County:

*Areas of different soils.*

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Westmoreland silt loam.....	283,776	77.9	Brooke silt loam.....	832	0.2
Steep phase.....	2,432		Monongahela loam.....	576	.2
Meigs silty clay loam.....	31,808	8.6	Atkins silt loam.....	448	.1
Pope silt loam.....	26,816	7.3	Tyler silt loam.....	320	.1
Monongahela silt loam.....	12,992	3.5	Monongahela sandy loam.....	128	.1
Westmoreland gravelly loam.....	2,560		Total.....	367,360	
Smooth phase.....	1,856	1.2			
Rough stony land.....	2,816	.8			

WESTMORELAND GRAVELLY LOAM.

The surface soil of the Westmoreland gravelly loam consists of pale-yellow, yellow, or yellowish-brown gravelly silty loam grading at about one-half inch to 2 inches into friable pale-yellow or yellow loam which usually shows no change downward. On the steep slope about three-fourths mile east of Bluff this soil consists of a pale-yellow to yellow gravelly loam, which passes into yellow very gravelly loam. The gravel consists of flattish angular sandstone fragments. One-half mile southwest of White Cottage the soil consists of brown silty loam, grading from about one-half to 1 inch into yellow silty loam, which shows no change down to bedrock, being quite friable all the way. Angular sandstone fragments are abundant from the surface down. No surface layer of gray soil, such as is found in places at this altitude in other parts of the State, could be found anywhere on this ridge at an elevation of 1,460 feet, although the surface was covered with leaves in many places.

This type is developed chiefly in the southwestern part of the county. The largest areas are on the steep slopes east of Holbrook and Woodruff, and near Bluff, White Cottage, and Delphene. Other

areas lie 1½ miles southeast of Bristoria and just north of Morford, and two areas are in the southeastern corner of the county.

This type occupies slopes too steep for cultivation, and in places the topography is rough and broken. A few large sandstone rocks outcrop. Owing to the steepness of the surface and the rapid runoff shallow gullies have formed in places. The gravel content retards erosion to some extent.

This type is not suited to agriculture and very little of it has been cleared. The forest growth consists of chestnut oak, white oak, hickory, maple, tulip poplar, black gum, locust, dogwood, walnut, and elm. There are also a few chestnuts and ash and many grapevines. This type of land should never be cleared of its forest growth.

*Westmoreland gravelly loam, smooth phase.*—The surface soil of the Westmoreland gravelly loam, smooth phase, differs from the typical soil in that it occupies areas not so steep as the average of the Westmoreland gravelly loam, and the surface soil is usually light brown to yellowish brown in color to an average depth of about 6 inches. Small flattish angular fragments of sandstone are abundant in both the soil and subsoil. Bedrock occurs at depths as shallow as 6 to 14 inches.

On a prominent knoll about 3 miles north of Waynesburg this phase consists of light-brown silt loam containing noticeable quantities of fine sand, underlain at depths of about 6 inches by yellow friable silt loam, which passes quickly into yellow moderately stiff silty clay loam to silty clay. On the crest of the ridge about three-fourths mile east of Bluff the soil in a wooded area consists of a yellow to pale-yellow gravelly silty loam to loam, showing no change to a depth of about 20 inches, as deep as it was possible to bore with the soil auger. In a cultivated field near this spot the surface is light brown to a depth of about 6 inches. In all the wooded areas a thin brown layer covers the surface. In a few places the stones are large enough to render the type stony, but these spots are small.

The largest areas of this phase are in the southwestern part of the county, generally occupying the tops of the hills and crests of the ridges above the typical soil. The few small areas occurring scatteringly through the central part of the county have a light-brown surface soil, differing from the surrounding Westmoreland silt loam in being gravelly, more loamy, and less deep to bedrock. These bodies are more silty than the rest of the phase. The topography is gently rolling to rolling and the drainage is good.

Much of this land is cleared and some cultivated crops are grown with fairly good results. According to the statement of one farmer, this gravelly soil has about half the value for wheat as the Westmoreland silt loam. A few orchards are found and appear to be doing well. Apples and peaches should do especially well.

#### WESTMORELAND SILT LOAM.

The greater part of the Westmoreland silt loam consists of light-brown to yellowish-brown silt loam, grading at about 8 to 10 inches into yellow or pale-yellow friable silty clay loam, which passes at depths of about 12 to 15 inches into a yellow or brownish-yellow, moderately friable to slightly stiff silty clay. The lower subsoil in places has a rather soapy or greasy feel at depths ranging from about

15 to 36 inches. Small fragments and particles of partly decomposed shale and sometimes of sandstone are present in the lower subsoil in quantities sufficient to give it a more friable structure than that of the upper subsoil. These fragments have a rusty-brown, brown, or yellow, and in places a greenish-brown color. The lower subsoil generally ranges in texture from silty clay loam to silty clay; in places it is slightly sandy.

In a number of small areas which follow around the hills at approximately the same level as the underlying parent rock, which is somewhat different from that occurring above and below such areas, the subsoil is a stiffer clay than that of the greater part of the type. Probably such areas are derived from limestone or have been influenced to a considerable degree by limestone material. One such area just north of Oakmont Cemetery near Waynesburg consists of yellowish-brown silt loam, grading at about 10 inches into yellow silty clay loam, underlain at about 14 to 16 inches by pale-yellow or light olive colored stiff clay, which in turn passes at about 24 inches into yellow, more friable silty clay, containing considerable partly decomposed shale material.

A short distance from this area the soil consists of brown silt loam, which passes into yellowish-brown silt loam, and this at about 10 to 12 inches into pale-yellow silty clay loam, underlain at 14 to 15 inches by pale-yellow, rather heavy plastic clay showing some olive-yellow mottling and even a little gray mottling in the lower subsoil. Between depths of about 20 and 24 inches yellow friable silty clay or silty clay loam containing much partly decomposed shale is reached. About 200 feet farther down the slope the soil is a brownish-yellow silt loam underlain by pale-yellow heavy silty clay or yellow silty clay loam, which passes quickly into friable yellow silty clay containing some brown and rusty-brown partly decomposed rock particles. Bedrock is reached beneath this at about 2 feet.

These small heavy areas, which are believed to contain more or less material derived from limestone, occur scattered throughout the entire county and generally support a heavy stand of bluegrass. Good results with alfalfa are obtained from them.

A representative slope of Westmoreland silt loam, about 1½ miles east of Ruff Creek, was examined from the foot to the crest of the ridge. This has a soil consisting of a light-brown or brownish-yellow silt loam, averaging about 8 inches in depth, grading into a yellow friable silty clay loam, which grades at an average depth of 10 or 12 inches into yellow rather heavy silty clay having a soapy or slick feel and showing some gray mottling below a depth of about 15 or 20 inches. The subsoil contains varying quantities of partly decomposed shale material, which is more abundant in the lower part, so that the material below depths ranging from about 16 to 24 inches is in places quite friable. Shale bedrock or decomposed shale occurs on this slope at depths ranging from about 18 to 30 inches, being deepest on the lower slope. This rock outcrops in some eroded situations or where the soil has slipped down the slope, as has happened in many places throughout the county.

In a forested area 1 mile southwest of Castile the soil consists of yellow silt loam with a grayish silt loam layer about one-half inch deep overlying the yellow in a few places. The yellow silt loam grades

at about 10 to 12 inches into yellow silty clay loam, this passing beneath into yellow silty clay, which is rather stiff below depths of 12 or 15 inches and shows some gray mottling.

In a few places the surface soil of small patches is dark gray to almost black to a depth of 3 or 4 inches and the subsoil shows more gray mottling. These patches occur on slopes, usually where the moisture content is maintained at a higher average than for the type, probably as a result of seepage. Such areas are too small and too irregularly distributed to be shown on a map of the scale employed in this survey. This is true also of that variation of the type which has a more friable subsoil. There are also a few included patches of Brooke silt loam and Westmoreland gravelly loam and gravelly silt loam.

A few small stony areas have been shown on the map by stone symbols. They differ from the typical Westmoreland silt loam chiefly in the presence of large fragments of sandstone. Locally the surface soil of these stony areas is rather dark in color due to accumulation of organic matter.

The Westmoreland silt loam is the most extensive soil type in Greene County and covers about 77 per cent of the entire area. The bulk of the soil material is residual from the underlying shales and sandstones and to a slight extent from limestone interbedded with these shales and sandstones. In some sections of the county calcareous shale and fine-grained sandstone, which effervesce with hydrochloric acid, are found where the limestone layers outcrop on the slopes, and small bands of Brooke silt loam, often only a few feet wide, occur along these outcroppings. In no place does the soil of the type effervesce with hydrochloric acid, either in the soil, subsurface, subsoil, or substratum sections, yet it seems to average considerably more productive than the Dekalb loam of Pennsylvania. This, it is believed, is due in part to a slight admixture of material derived from the associated thin strata of limestone. The type, for example, is a good bluegrass soil, whereas the Dekalb silt loam of Pennsylvania and West Virginia is not particularly well suited to bluegrass. The upper subsoil of this type appears to contain a little more clay than the corresponding section of the typical Dekalb silt loam, and it possesses a slightly higher degree of plasticity.

The topography of the Westmoreland silt loam ranges from rolling to steep, and the topography determines to a marked degree its value for agriculture. In the growing of clean-cultivated crops great care should be exercised to prevent erosion on the numerous very steep slopes used for this purpose.

The drainage of the type is well established and the run-off is rapid. Under the conditions it is surprising that so little erosion has taken place. In places the underlying rock strata prevent the water from percolating downward, thus giving rise to small seepage areas along the slopes where the water, following the bedding plane of the rocks, finds its exit at the place where the rock outcrops. These seepy places are imperfectly drained and have a surface soil darker than typical, and the subsoil sometimes contains gray mottling.

The Westmoreland silt loam is the most important soil in the county both in extent and in agricultural value. At least 75 per cent of it is cleared. The forest growth consists of white oak, red oak, post oak, chestnut oak, hickory, maple, ash, elm, hawthorn, hornbeam,



FIG. 1.—TOPOGRAPHY IN THE NORTHEASTERN PART OF GREENE COUNTY.

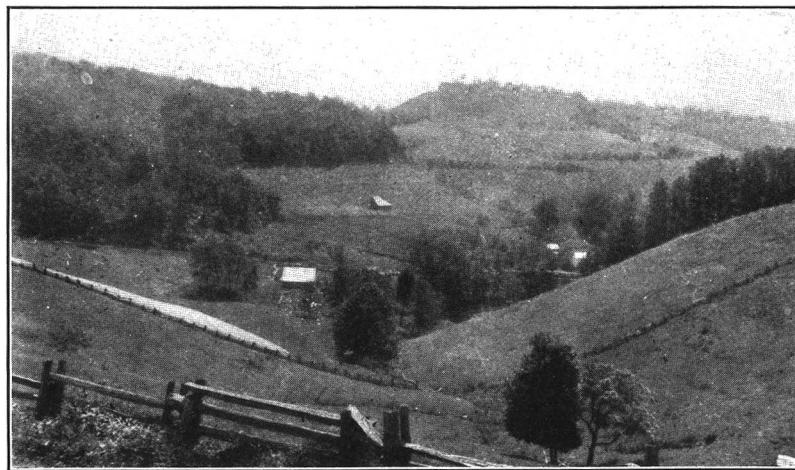


FIG. 2.—HILLY FARM LAND IN GREENE COUNTY.

The white in the left foreground is a field of buckwheat.



(or ironwood), walnut, and linden. Grapevines are common. A considerable part of the cleared land has grown up in thickets of blackberry and brush. About 80 per cent of the cleared land is in pasture.

This type is well adapted to the general farm crops suited to this climate. Hay, wheat, corn, and oats are the principal crops. At present the greater part of the hay is fed on the farms. When prices of wool and beef were high, stock raising was a profitable business, and is still being carried on. Nearly every farmer has a flock of sheep. Sheep raising probably brings greater cash returns to the farmer than any other farm industry or crop. The corn usually is consumed on the farm, and wheat and oats are used to a large extent as subsistence crops, although some wheat and flour is sold on the local markets. After the land has been in hay grasses for a few years, bluegrass crowds out the timothy and the red top and affords excellent grazing for stock. Fruits and many vegetables do well on this type.

Hay yields from 1 to 3 tons per acre, averaging about  $1\frac{1}{2}$  tons; wheat 10 to 30 bushels, averaging about 17 bushels; corn 30 to 70 bushels, averaging about 40 bushels; and oats from 20 to 50 bushels, averaging about 35 bushels.

The Westmoreland silt loam appears to be fairly easy to handle. The land is broken with hillside turning plows, usually following the contours of the slopes, and cultivation is usually done with one-horse cultivators.

While the soil does not erode as rapidly as many soils occupying similar steep slopes, considerable erosion takes place where clean cultivated crops are continuously grown on the steeper slopes. The means of prevention include seeding to grass or rotation with grass, and cultivating along the contours when the sod is broken. Hillside terraces might be used profitably here. Owing to the steepness of the greater part of this land, some farmers have found it advisable to grow only enough cultivated crops to feed the stock through the winter, and to keep the greater part of the land in permanent pastures. The soil being naturally very rich, these pastures often remain in grass for many years. Areas which have deteriorated because of hard usage often can be rejuvenated by the application of lime and acid phosphate and by growing clover or field peas.

Fertilizer is not in general use, but when used, about 200 pounds per acre of acid phosphate is drilled in with wheat, and about 150 pounds is used for corn when the crop is planted. The part of this type that is farmed can be kept in a good state of productivity by carefully conserving the stable manure and applying it in such a way that the land is manured at least once in a rotation. The manure should be applied on the sod before plowing for corn and this should be supplemented with about 200 pounds of acid phosphate per acre. An application of at least 300 pounds per acre of 16 per cent acid phosphate should also be applied to the wheat, and sufficient lime to insure a good catch of clover. An initial application of about 1,000 pounds of burnt lime or twice as much of ground limestone per acre, with subsequent lighter applications when shown to be necessary by soil tests, might prove profitable where cultivated crops are grown extensively.

The price of land of this type depends upon topography, state of improvement, farm buildings, transportation facilities, and nearness

to towns or villages. In the northwestern part of the county it ranges at the present time from about \$40 to \$75 an acre, while in the central and eastern parts the price ranges from about \$75 to \$135 an acre. This does not include right to the Pittsburgh coal vein.

*Westmoreland silt loam, steep phase.*—The steep phase represents slopes of Westmoreland silt loam which are entirely too steep for safe cultivation. The greater part of the Westmoreland silt loam is rather hilly and most of it is steeply sloping, but this phase is much steeper than the average and the depth to bedrock averages about 20 inches or less.

The phase as mapped occupies only a small acreage in the county. Many small patches that could not be satisfactorily separated have been included with the Westmoreland silt loam. The degree of slope of the Westmoreland silt loam ranges roughly from  $10^{\circ}$  to  $27^{\circ}$ , while this phase occurs in the main on slopes of more than  $27^{\circ}$ .

The surface soil of this phase contains some rock fragments, and the bedrock outcrops here and there. The land is suited only to forestry and pasture.

#### MEIGS SILTY CLAY LOAM.

The Meigs silty clay loam as mapped in this area represents a soil condition rather than a definite soil type. Soil of this kind consists of undifferentiated areas of Upshur silty clay loam and Westmoreland silt loam and silty clay loam, together with an intermediate or mixed soil of Upshur and Westmoreland material, so closely associated as to preclude separation on a map of the scale used. In places the Upshur soil has covered Westmoreland soil, and vice versa, as a result of the slides which frequently take place throughout this country, so that a boring will show Upshur or Indian-red material overlying Westmoreland or yellowish material on the one hand, and yellowish material overlying the Indian-red material on the other hand. Many borings show brown silt loam or silty clay loam overlying yellow silty clay, which passes down into Indian-red clay or Upshur material.

The areas of Upshur silty clay loam consist of Indian-red silty clay loam, which pass into Indian-red stiff clay, containing some yellowish and grayish partly decomposed rock material. These areas would have been mapped separately if they had been of sufficient size.

In places on some of the slopes where the wash or soil creep from the Westmoreland soil above has covered the red clay, there have been found areas of brownish surface soil overlying Indian-red subsoil. In other places where bands of red and brown shale occur at different elevations the areas are a patchy association of reddish-brown to reddish-yellow soil or brown and yellow soil mottled with Indian-red. Some of the Meigs silty clay loam as mapped is not typical, although having enough of the characteristics of the classification to be included with it.

The soil and subsoil vary considerably in depth, depending upon the position on the slopes. On steep slopes the run-off or erosion in places has kept close pace with the rock decay or soil accumulation. The bedrock is usually found at a depth of about 2 feet or more, and is exposed in places. Rock fragments of partly decomposed shale and sandstone are scattered over the surface and mixed with the

soil mass on most of this type, but seldom in sufficient quantity to interfere with cultivation. As mapped, however, there are included small areas of stony and shale loam, silt loam, and clay.

The Meigs silty clay loam is confined almost entirely to the southwestern part of Greene County and is most typically developed in the extreme southwestern corner along the West Virginia line. Most of the other outlying bodies occur along the lower slopes of the hills, except some smaller areas along the crests of ridges and tops of hills. The largest of these are mapped 2 miles west of Graysville, around Video, and in the vicinity of Luke, Minet, and Oak Forest.

This soil occupies steep slopes, parts of which are too steep to cultivate. The surface as a whole is steeper than that of the Westmoreland silt loam, the tops of the ridges are generally narrow and irregular, and more V-shaped valleys have been formed than in the Westmoreland silt loam. The ridge tops rise from about 350 to 600 feet above the valley floors. A noticeable feature on some of the areas consists of narrow benches or shoulders in bands around the slopes, which have been caused by slides. On these benches the soil is deep and more productive than that of the uniform steep slopes. Owing to the shallow depth, the soil is not so retentive of moisture in many places as the Westmoreland silt loam. Nearly all the small streams dry up during dry weather.

The greater part of the Meigs silty clay loam is cleared and is in grass or is being cultivated; the remainder supports a forest growth consisting chiefly of elm, walnut, chestnut, hickory, poplar, oak, and black locust.

This soil produces good crops of corn, wheat, oats, and hay on areas that are not too steep for cultivation, and the steeper slopes support fairly good grass for pasture, especially those facing north and east. The southern and western slopes are exposed to more sunshine, and alternate freezing and thawing in the winter cause the soil to be more readily eroded than on the northern slopes. In some places on the southern slopes there is very little grass. Corn yields from 25 to 60 bushels, averaging about 35 bushels; wheat 10 to 15 bushels, averaging about 12 bushels; and oats from 20 to 40 bushels, averaging about 25 bushels. Hay yields an average of about 1½ tons per acre. Apples, peaches, plums, and berries do well. Potatoes, tomatoes, cabbage, beans and other vegetables are grown with good results in home gardens. Small herds of sheep and beef cattle are raised, and livestock production seems to be the most profitable industry.

Farmers generally try to keep the steeper slopes in grass for pasture. The smoother areas are cultivated, the rows following approximately along the contours so as to prevent serious erosion. Not enough care is taken, however, to stop this erosion. Very few farmers use any fertilizer. A little acid phosphate is used.

This type of soil at present (1921) sells for about \$30 to \$80 an acre, not including rights to the Pittsburgh coal vein, depending upon topography, condition of the soil, improvements, and nearness to good roads and villages.

The life of the grass sod might be prolonged by applying a top-dressing of lime and acid phosphate. Great care should be exercised to prevent erosion when this soil is changed from sod to a cultivated crop.

## BROOKE SILT LOAM.

The surface soil of the Brooke silt loam is a brown to yellowish-brown silt loam to silty clay loam to a depth of about 4 to 10 inches, underlain by yellow to brownish-yellow, heavy clay loam to clay, which is fairly friable when dry but plastic when wet and dries out to a dirty brownish yellow or drab in road cut exposures. The subsoil below about 18 to 24 inches is usually an olive-drab, plastic heavy clay, mottled with yellow and brown. As seen 2½ miles northwest of Mather, the soil of this type is yellowish-brown silt loam ranging from about 3 to 10 inches in depth, and the subsoil is a yellow, friable silty clay loam which passes into yellow, plastic, heavy clay with a varying amount of rusty-brown mottling, and frequently gray mottling in the lower part. The rusty-brown mottling apparently represents concretionary material. The subsoil usually shows a dove color or bluish-gray cast along with the yellow color and contains friable decomposed rock particles, apparently consisting of shale. Some limestone fragments are scattered over the surface. The underlying rock is bluish-colored limestone. In places the silt loam surface soil has been washed off and the silty clay loam is exposed.

A narrow strip on the slope between the terrace and the bottom of South Fork Tenmile Creek at Jefferson consists of brown silt loam about 10 inches deep, over yellowish-brown silty clay loam, which passes at about 12 to 14 inches into yellow, heavy, somewhat plastic clay showing brown and dove-colored mottlings in the lower part of the subsoil, and passing at about 26 inches into more friable, bluish, yellowish, and brownish material. Another narrow strip between the terrace and bottom soils on the west side of the Monongahela River at Hatfields Ferry consists of a brown surface soil, underlain by yellowish-brown rather waxy clay loam to clay, passing at about 15 to 24 inches into grayish, brownish, or yellowish and bluish plastic clay. In a few places the surface soil is dark brown or almost black and the subsoil is drab or dark brown.

The surface soil of this type contains more clay than that of the Westmoreland silt loam. Small spots of Brooke clay loam are included with the type as mapped. Limestone fragments are usually present on the surface and the limestone strata from which the soil is derived is in evidence. The surface in many places appears similar to that of the Westmoreland silt loam, but the subsoil is different in texture, color, and structure. If this soil is plowed under proper moisture conditions a mellow seed bed is obtained, but if plowed when wet it forms clods which harden later.

The type occurs mainly on the tops of the hills and in sags between the hilltops that are of about the same elevation. A few narrow strips occur along the border line between the terrace and first-bottom soils; in these the surface soil seems to be mixed with alluvial deposits and the subsoil is residual from the underlying limestone.

Many limestone strata outcrop around the slopes and have given rise to narrow bands of Brooke silt loam mixed with Westmoreland silt loam. These areas are very small and irregularly distributed and are included with the Westmoreland silt loam.

The Brooke silt loam is a decidedly productive soil. Bluegrass flourishes on it everywhere, and the patches of alfalfa are of excellent

quality. The areas are small and scattered, but they are considered important upon the farms containing them. All of this type is cleared and is either being cultivated or is in grass. This land is never sold separately.

The following table gives the results of mechanical analyses of samples of the soil, subsurface, and subsoil of the Brooke silt loam:

*Mechanical analyses of Brooke silt loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
182815	Soil, 0 to 8 inches -----	3.0	3.4	1.2	5.0	7.0	51.8	28.6
182816	Subsurface, 8 to 20 inches -----	.6	2.0	1.0	3.0	2.8	38.8	51.8
182817	Subsoil, 20 to 36 inches -----	.2	2.1	.8	7.5	2.9	26.7	59.9

MONONGAHELA SANDY LOAM.

The surface soil of the Monongahela sandy loam is grayish-brown to yellowish-brown rather loose sandy loam, ranging in depth from about 6 to 10 inches. The subsoil is a yellow very friable sandy clay loam to loam, which continues downward without any change in color or structure, but varies in texture from a sandy clay loam to loamy sand or sandy loam. In some of the type the color is sufficiently brown to have been classed in the Elk series, but no separation was made on account of its small extent.

Only one area of this type was mapped. It occupies a faint ridge, surrounded by the Monongahela silt loam, 1 mile northeast of Mapletown. It has a gently rolling topography and excellent drainage.

This type is not as productive as the associated Monongahela silt loam. The same crops are generally grown as on the silt loam, but the yields average lower. At present it is being used mainly for hay and pasture land. The type is handled in the same manner as the adjoining Monongahela silt loam.

This soil is adapted to early vegetables. It is deficient in organic matter, but this can be supplied by growing soybeans, cowpeas, and other legumes, and occasionally turning under a crop. Liberal additions of barnyard manure also are very beneficial.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Monongahela sandy loam:

*Mechanical analyses of Monongahela sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
182813	Soil, 0 to 8 inches -----	1.3	14.0	17.6	38.4	3.7	19.6	5.4
182814	Subsoil, 8 to 36 inches-----	.6	11.4	16.4	41.8	3.0	14.7	12.1

## MONONGAHELA LOAM.

The Monongahela loam is a light-brown to brown mellow loam or gritty loam, ranging in places to fine sandy loam, underlain at about 8 or 10 inches by yellow to pale-yellow friable, gritty loam, sandy clay loam, or sandy clay. In places the subsoil is a yellow to brownish-yellow, rather heavy sandy clay, faintly mottled with gray and containing some small white quartz gravel. Some well-rounded gravel of quartz and sandstone is distributed throughout both the soil and subsoil in places, but usually the gravel is below the 3-foot depth. As seen 1 mile southeast of Rices Landing the Monongahela loam is a brown, mellow, gritty loam, underlain at about 10 to 12 inches by yellow, friable, gritty loam, passing into yellow, friable, sandy clay, which is somewhat stiffer at a depth of about 30 inches. The substratum contains some grayish and yellowish silty clay and in places bluish and Indian-reddish clay. In a few places the Indian-red stiff clay is present in the lower subsoil, apparently having been derived from Indian-red rocks transported by the river. Rounded gravel and cobbles of sandstone are present in the subsoil.

The soil of an included area lying 1 mile southwest of Carmichaels consists of brown fine sandy loam to loam, ranging in places close to a silt loam, underlain at about 10 inches by yellow, friable, fine sandy clay, which in the lower subsoil passes into Indian-red, friable, fine sandy clay. Here the soil occurs on the floor of an abandoned valley of the Monongahela River. The areas of more brownish soil with unmottled yellow or brownish-yellow subsoil included with this type represent the Elk loam.

Only five bodies of this type are mapped in this area. They are found just west and south of Paisley, about 1 mile south of Carmichaels, 1½ miles south of Crucible, and about 1 mile south of Rices Landing. The type occupies rather small areas in the old floor of the Monongahela River, and the component material is of alluvial origin. The surface is nearly level to very gently rolling. Owing to the position and the permeable soil and subsoil the drainage is excellent.

The Monongahela loam comprises a small area in this county, but it is a very good soil for all crops grown in this section. It is intimately associated with the Monongahela silt loam, and the crops, yields, methods of handling, fertilizer treatment, land values and farm practices are the same as those on the silt loam.

The following table gives the results of mechanical analyses of samples of the soil, subsurface, and subsoil of the Monongahela loam:

*Mechanical analyses of Monongahela loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>				
182818	Soil, 0 to 8 inches-----	1. 4	9. 6	8. 9	16. 0	8. 4	45. 2	10. 4
182819	Subsurface, 8 to 16 inches-----	2. 1	10. 1	8. 2	12. 2	7. 6	40. 4	19. 4
182820	Subsoil, 16 to 36 inches-----	2. 9	14. 1	9. 5	11. 1	9. 5	22. 2	30. 6

## MONONGAHELA SILT LOAM.

The Monongahela silt loam consists of about 6 to 12 inches of light-brown to yellowish-brown mellow silt loam, underlain by yellow to pale-yellow friable silty loam to silty clay loam, faintly mottled with gray, and passing at a depth of about 18 to 22 inches into yellow rather heavy silty clay loam to clay, of slightly compact nature, usually mottled with gray and light brown. On the western edge of Jefferson the type consists of light-brown to brown silt loam, about 6 to 10 inches deep, overlying yellowish-brown to yellow silty clay loam, which quickly passes into yellow silty clay, and this into compact silty clay, mottled yellow or gray and bluish gray. A few patches of Robertsville silt loam are included with this type in this part of the county.

About 2 miles west of Waynesburg, on a small strip of terrace, with probably some colluvial material on the outer edge near the foot of slopes, the Monongahela silt loam consists of brown silt loam about 10 to 12 inches deep, over yellow, friable silty clay loam, which passes at about 18 inches into yellow, moderately friable silty clay, which, in turn, passes below into rather compact silty clay, mottled some with rusty brown and gray.

On a level bench near Tenmile Creek,  $1\frac{3}{4}$  miles north of Clarksburg, the soil is a brown, mellow silt loam, containing some gritty material but not enough to classify it as loam, and the subsoil is a yellow, friable, gritty clay passing into yellowish sandy material resembling disintegrated sandstone. A few angular sandstone fragments were found on this variation. In some places the subsoil passes into loamy fine sand or fine sandy loam at depths ranging from about 20 to 36 inches, while in other places next to the upland slopes, where the material may be partly residual and partly colluvial, the subsoil is somewhat heavier, ranging from a silty clay loam to a silty clay of slightly plastic structure. Near Carmichaels and 2 miles southwest of Crucible there are patches which are underlain by Indian-red friable sandy loam, sandy clay, or rather heavy clay, and occasionally with a yellowish sandy material.

The type is usually free from stone and gravel, but in places below 3 feet there are beds of material varying in size from fine gravel to large well-rounded cobbles and bowlders, as seen in a road cut near Paisley. In other places where the shale and sandstone ledges come near the surface there are a few fragments of sandstone in the soil mass, as noted near Crucible. Along the sides of ravines the soil mantle overlies either strata of sandstone or of limestone, but these usually occur below the 3-foot section, and the soil as a whole is generally several feet deep.

The Monongahela silt loam is confined chiefly to the old valley floor of the Monongahela River and the high terraces along the larger creeks. The largest areas are south of Rices Landing and Crucible, around Jefferson, and at Carmichaels, Mapletown, Dunkard, and Mount Morris. The areas are not continuous, as in places the river seems to have flowed through narrow gorges and built up no terraces. The river at one time had a swift current and deposited gravel and large bowlders which lie several feet under the present surface. In many places, especially in the vicinity of Carmichaels, a heavy clay overlies the gravel beds.

The Monongahela silt loam is an old terrace soil, and the surface was originally flat. The greater part of the type has been dissected by erosion, so that much of it is gently rolling, in places sloping off to the first bottoms, in other places dropping by a short bluff. These terraces rise from 30 to 250 feet above the stream channel.

The Monongahela silt loam is an important agricultural soil and nearly all of it is in use. It is adapted to all of the crops grown in this county. Corn, hay, and wheat are the principal crops. Much of it is used for hay and pasture. Timothy, redtop, and clover are cut for hay, and when bluegrass crowds out the other grasses the land is used for pasture for a period of years. Vegetables do well on this soil, potatoes giving especially good yields. A few small dairies are located on this soil, and hogs, cattle and sheep are raised on every farm, mostly for home use. Corn yields 30 to 75 bushels, averaging about 40 bushels per acre; wheat from 10 to 22 bushels, averaging about 16 bushels; hay from 1 to 3 tons, averaging about 1½ tons.

Relatively more of the cultivated crops are grown on this type than on the uplands because it can be plowed without danger of erosion. The same kinds of farming implements and machinery are used as on the smoother areas of the upland soils. Fertilizers are used to some extent, but fertilization is not generally practiced. Land values on the Monongahela silt loam range from about \$75 to \$150 an acre for farming.

Since the recent development of several coal-mining villages along the Monongahela River, the farmers are turning toward the growing of more fruits, vegetables, and truck crops. This type is well adapted to a wide range of vegetables, and trucking should become an important industry. Small fruits and berries should do well.

This soil is deficient in organic matter, but this can be supplied by applications of barnyard manure and by turning under legume crops, such as field peas, soybeans, clovers, and vetch. The soil should be manured and limed once in each rotation and phosphoric acid should be applied to corn and wheat. The addition of 200 pounds 16 per cent acid phosphate to corn and 300 pounds to wheat at time of seeding is recommended.

The following table gives the results of mechanical analyses of samples of the soil, subsurface, and subsoil of the Monongahela silt loam:

*Mechanical analyses of Monongahela silt loam.*

Number.	Description.	Fine	Coarse	Medium	Fine	Very fine	Silt.	Clay.
		gravel	sand.	sand.	sand.	sand.		
182810	Soil, 0 to 9 inches .....	0.8	2.3	1.8	9.6	8.2	63.0	14.2
182811	Subsurface, 9 to 20 inches .....	.6	2.6	1.7	9.4	9.4	53.4	22.9
182812	Subsoil, 20 to 36 inches .....	.2	1.4	1.8	15.2	11.8	47.5	22.0

## TYLER SILT LOAM.

The Tyler silt loam consists of a light-brown to gray or mottled silt loam underlain at about 6 to 10 inches by yellowish and grayish silty clay loam, passing at 12 to 15 inches into light-gray or bluish-gray silty clay loam to silty clay, with some pale-yellow mottling. In places the lower subsoil is a light bluish gray rather compact clay, containing some brown concretions.

This type comprises only a few small areas in the eastern part of the county near Carmichaels, Jefferson, and 1½ miles south of Crucible. It occupies flat to gently sloping terraces, associated with the Monongahela silt loam, the difference being the result of imperfect drainage. The elevation above the Monongahela River averages about 150 feet. The close compact subsoil is more or less impervious and the areas are generally wet and cold and contain some crawfish holes.

Owing to its poorly drained condition the type is best adapted to grasses. When drained by open ditches or tile it produces fair crops of corn and small grain. In wet seasons crops are drowned out by the excessively wet conditions, as the impervious subsoil holds the water on the surface.

## POPE SILT LOAM.

The Pope silt loam to a depth of about 8 to 15 inches consists of a brown to deep-brown friable silt loam. The subsoil is usually a little lighter in color than the surface soil, ranging from light brown to yellowish brown, and it is usually heavier in texture, ranging from heavy silt loam to silty clay loam, but in places the lower part of the subsoil is as light as a fine sandy loam. In many places the change from soil to subsoil is so gradual as to be almost imperceptible. As seen in bottoms at Ruff Creek, the surface soil is a deep-brown silt loam passing at depths of about 12 to 15 inches into lighter brown silt loam or heavy silt loam. In places the lower subsoil is a silty clay loam and in other places it ranges to a fine sandy loam, frequently mottled light brown, rusty brown, and gray. The type is almost entirely free from gravel and stone fragments, except near the foot of the steep slopes from the upland.

About 1½ miles east of Ruff Creek a small area consists of brown mellow silt loam, grading at about 15 inches into a somewhat lighter brown, mellow silt loam to loam, and this, in the lower subsoil, into brown friable loam. On a slightly higher part of the bottom at this place, lying between the typical Pope silt loam, which follows the banks of Ruff Creek, and a strip of Atkins silt loam at the foot of the uplands along the outer edge of the bottoms, the soil consists of brown silt loam, underlain by yellow rather stiff clay, mottled with rusty brown in the lower part of the 3-foot section, and containing much rusty-brown concretionary material. Along some of the streams in the eastern part of the county the texture of small included areas consists of fine to medium sandy loam, especially that of a strip near the banks of the streams, while in other small areas the texture ranges

to a silty clay loam, and clods if plowed when wet. If the fine sandy loam areas had been of sufficient size, they would have been mapped as Pope fine sandy loam.

A few small areas in the southwestern part of the county with a chocolate-brown surface soil were also included in this type. These represent an approach to the Moshannon silt loam, which is an Indian-red to Indian reddish brown first-bottom group of soils derived in part or wholly from the Indian-red Upshur soil.

This soil is still in process of formation. The material is composed of sediments washed from the upland soils and laid down by the streams over their flood plains in times of high water. The material has been washed mainly from the Westmoreland silt loam, or indirectly from sandstone, shale, and limestone.

This type is widely distributed throughout the county, but the total extent is only 26,816 acres. It occurs in many narrow strips in stream bottoms. These strips are usually flat or faintly sloping in the direction of the stream flow. Drainage is fairly well established, though small areas could be improved by ditches.

The Pope silt loam is a strong, productive soil and all of it is under cultivation, corn, oats, and hay being the principal crops. Corn is the leading cultivated crop and yields of 100 bushels or more per acre are reported, without the use of commercial fertilizer. This soil is especially adapted to corn and is usually relied upon to supply all the corn needed on the farm.

Oats and other small grains are grown, with fair yields, but there is a tendency for small grains to grow too rank and to lodge. Timothy and clover are the main hay crops, and yields of from 1 to  $3\frac{1}{2}$  tons, averaging about 2 tons per acre, are common. Good pastures are easily maintained, and when moisture conditions are favorable the growth of grass throughout the grazing season is excellent. At the foot of slopes, where some colluvial material is mixed with this soil, fair yields of potatoes of good quality are obtained. A few small dairies are located on the type, and where farmed in connection with upland types, dairying and cattle raising should prove profitable.

Fertilizer is seldom used on this soil, but it often receives all of the available supply of barnyard manure. The frequent overflows of the streams and consequent deposition of fresh alluvium tend to keep the soil fertile. In many places, however, the growing of legumes would probably be beneficial. Crops along the streams are sometimes damaged by overflows.

Many farms contain various-sized areas of Pope silt loam, and where this soil occurs to an important extent, it increases the value of the farm.

#### ATKINS SILT LOAM.

The Atkins silt loam, as seen 1½ miles east of Ruff Creek, is a mottled light-brown, rusty-brown and gray, heavy silt loam, or a brown silt loam which quickly passes into such mottled material, underlain at about 6 to 8 inches by bluish-gray or light-gray silty clay loam or silty clay, mottled with brown or rusty brown, which passes into bluish-gray impervious clay, mottled with rusty brown and containing many rusty-brown concretions. This soil is wet and soggy, and is locally known as "crawfish land."

About one-half mile east of Khedive, in the wet bottoms of Muddy Creek, the soil has been thrown up into beds, with a width of about 80 feet from center to center of the intervening depressions or water-furrows, in order to improve the drainage. The soil on the beds is a mottled light-brown and grayish-brown silt loam showing some gray, the gray increasing with depth. The subsoil is a silty clay loam to silty clay, mottled pale yellow and bluish gray. The depressions have a silty clay loam surface soil showing more gray. In places the subsoil is dark bluish gray or almost black, due to accumulation of organic matter. Some included areas consist of Atkins silty clay loam.

This type occurs usually along the outer edge of bottoms in poorly drained situations, its surface being low and flat, and water stands on it in wet seasons. The largest areas are along Muddy and Whitley Creeks. Small patches occur in the stream bottoms throughout the county.

The Atkins silt loam is an unimportant soil type, with only a small total area in the county. It is adapted to redtop, alsike clover, and various native grasses, and is used principally for pasture land. It is so intricately associated with the Pope silt loam that many spots too small to warrant separation were included with that type.

When this soil is properly drained it produces fair crops of corn, wheat, oats, and hay. In some places the drainage is improved by bedding the land at right angles to the stream. On the higher part of these beds a good stand of bluegrass was seen along Muddy Creek; the lower parts were wet and occupied by native water-loving grasses.

#### ROUGH STONY LAND.

Rough stony land represents areas which are too steep and stony to cultivate and therefore unsuited to agriculture. Some soil, which is mostly a loam in texture, is found between the stones and bowlders, except on the bare rock exposures. This land is confined to the steep bluffs and hillsides along the Monongahela River and some of the smaller streams. It owes its existence to the massive beds of sandstone and limestone which outcrop generally near the top of the hillsides, forming very steep slopes. There are some almost perpendicular cliffs below which the accumulation of rocks gives rise to stony slopes containing some large bowlders. Rock outcrops are numerous.

Landslides are common, and these tend to make the land steeper and rougher. Some areas support little or no vegetation. The roughest and least desirable areas occur along the Monongahela River. A few smaller areas are in the northwestern and southern parts of the county.

With the exception of a few small cleared areas which support some grass and can be pastured to a limited extent, all of this type is forested, supporting a growth of elm, walnut, chestnut, oak, hemlock, black locust, and ash.

#### SUMMARY.

Greene County lies in the extreme southwestern corner of Pennsylvania. It has an area of 574 square miles, or 367,360 acres. The topography ranges from nearly flat in the stream bottoms and on the terraces to gently rolling, rolling, and very hilly in the uplands.

Monongahela River and its tributaries drain about four-fifths of the county. The western part is drained by streams entering the Ohio River. The soils of the county are well drained, except on a few small terrace and first-bottom areas.

The population of Greene County in 1920 was 30,804, of which 89.2 per cent was classed as rural. The rural population averages 47.9 persons per square mile. Waynesburg, the county seat, is the largest town, with a population of 3,332.

Most of the county needs better, more convenient transportation facilities. Public roads are good through the summer months. A few brick roads reach out a few miles from some towns and several concrete roads are under construction.

The mean annual temperature of Greene County is 51.2° F., the winter mean being 30.5° F., and the summer mean 69.9° F. The average annual rainfall amounts to 40.68 inches. The average snowfall for the year is 34.9 inches.

Agriculture began in Greene County as early as 1760. At present hay, corn, wheat, and oats are the main crops, and stock raising and wool production the chief industries.

No systematic rotation of crops is practiced, and the use of fertilizer is not common.

Farms range in size from 10 to 500 acres, averaging 110.1 acres in 1920. Owners operated 80.4 per cent of all farms in 1920, tenants 18.2 per cent, and managers 1.4 per cent. The selling price of land ranges from \$40 to \$150 an acre, exclusive of mineral, oil, or gas rights.

Greene County is situated in the Allegheny Plateau, and the upland soils are residual from noncalcareous shales and sandstones, and to some extent from interbedded limestone. The soils of the stream terraces consist of old-alluvial deposits now standing well above overflow, while those of the first bottoms consist of recently deposited alluvium to which fresh additions are made by each overflow.

Ten soil types and two phases, representing seven soil series, in addition to Rough stony land, have been mapped. The Westmoreland silt loam is by far the most extensive soil type.

The Westmoreland silt loam, Meigs silty clay loam, and Brooke silt loam are the most important upland soils. The Monongahela silt loam and Monongahela loam are the important agricultural soils of the old stream terraces or second bottoms; and the Pope silt loam is the important soil of the first bottoms.

The Tyler and Atkins silt loams are poorly drained second-bottom and first-bottom types, respectively.

Westmoreland gravelly loam, with a smooth phase, the steep phase of the Westmoreland silt loam, and Rough stony land are of rather small extent. These have a rolling to steep and broken topography, and are for the most part forested. With the exception of the smoother areas of the gravelly loam, these soils are best suited to forestry or to forestry and grazing.

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SOIL MAP

PENNSYLVANIA  
GREENE COUNTY SHEET

